SUSTAINABLE URBAN PLANNING DEVELOPMENT INDICATORS MODEL FOR NEIGHBOURHOODS IN TRIPOLI, LIBYA

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DEDICATION

For my beloved mother,

Eng. Amal Mohamed Traish

And

My dearest father,

Dr. Abdulmotaleb Mohamed Elgadi,

And

My sweet brothers,

Mohamed, Mawada, Mahmoud, and Moaied.

May ALLAH Protect and Bless Us All the Times.

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"May Allah Bless Us All To Achieve Excellence in Life"

ABSTRACT

All developmental and urban planning practices in Libya have been carried out for improving the neighbourhoods sustainability, whilst decreasing their effect on the resources and the natural environment. Hence, a proper understanding of the elements, which contribute to the sustainable urban planning development indicators of neighbourhoods is essential. The aim of this study is to develop a Sustainable Urban Planning Development Indicators (SUPDI) model, focuses on various SUPDI elements such as social, economic, environmental and institutional for a neighbourhoods in Tripoli, Libya. The effect of these elements on perceived personal responsibility towards the adoption of the SUPDI model for neighbourhoods in Tripoli, Libya was also investigated. First step of this research was literature on existing sustainability indicators related to neighbourhoods planning reviewed to identify 46 sustainability indicators that clustered into four elements, which influence SUPDI. These sustainability indicators and assigned elements were validated by 77 practitioners during the pilot study. Secondly, the actual survey was completed by a total of 307 practitioners who tested the validity of the model and the proposed hypotheses. Thereafter, the results were analysed using SPSS and Smart-PLS techniques. The statistical analysis showed that the four elements positively affected the SUPDI and perceived personal responsibility. Furthermore, perceived personal responsibility towards the SUPDI models showed the highest beta value (β = 0.426), followed by the environmental (β = 0.253), social (β = 0.213), economic (β = 0.173), and institutional (β = 0.170) parameters. While examining the validity of the various models, results found that the SUPDI model had a good model fit value of R^2 = 0.379. The SUPDI model used in this study very reliable and it could help developers and planners understand the importance of sustainability-related risks seen in neighbourhoods. This could also assist them to further implement and develop more informed and responsible decisions for improving neighbourhood sustainability.

ABSTRAK

Amalan pembangunan dan perancangan bandar di Libya telah dijalankan untuk meningkatkan kemampanan kejiranan dan mengurangkan kesannya terhadap sumber dan alam sekitar. Oleh itu, pemahaman terhadap unsur-unsur yang menyumbang kepada pembangunan perancangan bandar yang mapan di kawasan kejiranan adalah penting. Tujuan kajian ini adalah untuk membina model Petunjuk Pembangunan Perancangan Bandar yang Mapan (SUPDI) menumpukan kepada elemen SUPDI yang merangkumi petunjuk sosial, ekonomi, alam sekitar dan institusi di peringkat kejiranan di Tripoli, Libya. Kesan petunjuk-petunjuk ke atas tanggapan tanggungjawab peribadi terhadap penggunaan model SUPDI di peringkat kejiranan di Tripoli, Libya juga dikaji. Langkah pertama penyelidikan ini adalah kajian lepas tentang petunjuk kemampanan yang berkaitan dengan perancangan bandar di peringkat kejiranan dikaji semula untuk mengenal pasti 46 penunjuk dan kemudiannya dikategorikan mengikut empat elemen yang mempengaruhi SUPDI. Petunjuk kemampanan dan unsur-unsur lain telah disahkan oleh 77 orang responden semasa kajian perintis. Kedua, soal selidik telah dijawab oleh 307 orang responden yang menguji kesahihan model dan hipotesis yang dicadangkan. Hasil kajian dianalisis dengan menggunakan SPSS dan teknik Smart-PLS. Analisis statistik menunjukkan bahawa keempat-empat elemen yang disebut mempengaruhi SUPDI dan tanggapan tanggungjawab peribadi secara positif. Tambahan pula, tanggapan tanggungjawab peribadi terhadap model SUPDI menghasilkan nilai beta yang tertinggi (β = 0.426), diikuti petunjuk alam sekitar (β = 0.253), sosial (β = 0.213), ekonomi (β = 0.173) dan institusi (β = 0.170). Semasa kesahihan pelbagai model dikaji, didapati bahawa model SUPDI merupakan model yang sesuai dengan nilai R^2= 0.379. Model SUPDI yang digunakan dalam kajian ini boleh dipercayai dan dapat membantu pemaju dan perancang untuk memahami kepentingan risiko yang berkaitan dengan kemampanan di kawasan kejiranan. Model ini juga dapat membantu mereka untuk melaksanakan keputusan yang lebih bijak dan bertanggung jawab untuk meningkatkan kemampanan kawasan kejiranan.

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CHAPTER 1

INTRODUCTION

1.1. Background

In the past few years, the Libyan government has been taking steps for making Libya a very sustainable country, such that it could set an example for the neighbouring countries. For this purpose, the administrators must assess the existing conditions at varying scales, like regions, districts, cities, neighbourhoods and buildings (Karban, 2014). A neighbourhood is considered to be the smallest planning unit in any city, which comprises open spaces, buildings, streets, people, etc. During the early 21st century, several factors posed a challenge to the human existence and contributed to numerous economic, social and environmental issues in the world (McMichael, 2012). Some of these factors include industrialisation, uncontrolled urbanisation, intense agricultural activities, rapid population growth, and the increase in resource consumption. Hence, there is a need to implement a better response to the detrimental effects of human activities and their over-exploitation of the planet (due to their environmental, economic, social, and institutional development), by adopting the sustainability principles (Srivastava *et al.*, 2016).

In their study, Pearce *et al.*, (2013) described the Brundtland report, which was one of the initial attempts, wherein the global community attempted to identify the various issues affecting mankind, worldwide. In this report, the panel attempted to recognise the challenges of addressing environmental degradation, poverty or underdevelopment, by suggesting the concept of a sustainable development. Sustainable development can be defined as satisfying all the current requirements

without affecting the ability of future generations to fulfil their own demands (Borowy, 2013). Initially, a few of these objectives focused on the global issues, and thereafter, began concentrating on the national issues. However, a majority of the experts believed that such issues could be best recognised or controlled at the local level in the communities, municipalities or the neighbourhoods (Camagni, 2012).

In 1992, the panel attending the Rio Earth Summit (UNCED) adopted Agenda 21, wherein work was initiated in the field of sustainability, under the title 'Green Accounting'. Agenda 21 aimed to implement plans for sustainability development, known as 'Local Agenda 21s', which set particular indicators by the local authorities and communities (Turcu, 2013). According to Agenda 21, the local authorities were the best representative of the general people, and they need to develop and implement local sustainability plans. Hall and Pfeiffer (2013) stated that by 2002, more than 6,400 local authorities from 113 countries had developed and implemented the Local Agenda 21. The investigation of the sustainable neighbourhoods is especially challenging due to the complex and unique interactions occurring between the different variables, which cover the economic, social, environmental and institutional parameters. Additionally, analysis of the neighbourhood sustainability depends on the selected for defining the needs of every neighbourhood (Choon *et al.*, 2011).

The sustainability indicators support in future decision-making and measuring sustainability in different ways, wherein complex social science and physical data are made more accessible for improving decision-making (Bai and Sarkis 2014). The indicators can act as an early warning system for preventing the economic, social, environmental and institutional damage (Horner *et al.*, 2007). Hence, they are considered to be important tools for connecting ideas and thoughts (Bai and Sarkis 2014).

Studies suggested that the indicators must be developed using logical structures, known as modelling frameworks (Upward and Jones 2016). The frameworks encourage interpretation, which made the indicators very effective. The indicators help, explain and determine the elements, which must be measured, the conclusions that can be drawn from the measurements, and the indicators that can be applied (Upward and Jones, 2016). In the absence of a modelling framework, the indicators are generally partial, unplanned, and aligned towards a specific knowledge; which further complicates the interpretation, since more research is

conducted in a few regions compared to some others (Bossel, 2015). One important advantage of implementing the indicator modelling frameworks is that they are used as a tool for categorising all indicators for determining the important issues, which were covered or ignored (Bollen and Bauldry, 2011).

Hamedani and Huber (2012) recommended using the theme LEED and BREEAM frameworks along with a set of sustainability indicators as a benchmark for identifying or consolidating the indicator programmes being used. In this thesis, the researcher developed a modelling framework for the SUPDI, of the neighbourhoods in Tripoli Libya. This framework modified, combined and reviewed the earlier studies, which could help the designers and planners to assess and implement sustainability at a neighbourhoods.

1.2. Problem Statement

The construction and urban planning sector has contributed enormously towards the economic activity, employment, and growth in Libya (Housing & Infrastructure Board in Libya, 2013). As the population density increases, so does the demand for residential homes, especially for urban residential neighbourhoods. The rate of urbanisation in Libya has increased rapidly from 21% in 1990 to 70% in 2013 (Alsharif and Pradhan, 2014). An assessment by the Districts & Major Cities, Libya, (2015) showed that the population density in Tripoli, Libya in 2015 was 2.126 million and 1.050 km^2 per unit of land area. As a result, the demand for housing in urban neighbourhoods increased dramatically, causing a severe shortage of housing in urban residential neighbourhoods.

According to the United Nation's Commission on Sustainable Development (UNCSD, 2009), there is still a lot of work to be done on reaching the goals of sustainability in which relevant countries should attempt to implement and develop initiatives towards these goals. In 2004, the evaluation of various national strategies showed that only 24% out of 191 countries had implemented and developed sustainability strategies (Linnér and Selin, 2013). On the other hand, many countries lacked basic planning and implementation of selected sustainability indicators (Sharifi and Murayama, 2013). Sustainable development indicators alone are not

sufficient for implementing plans. Thus, a flexible approach and support from the local government are needed when dealing with planners. Hence, there is a need to focus on the study of content pertaining to local sustainability which includes policy elements, time frames, analytical tools and aspects of governance such as institutions, stakeholders and local links, in order to improve sustainability as recommended by the Organisation for Economic Cooperation and Development (OECD, 2012). In addition, there is a need to study, compare and review the sustainability indicators found in various cities (Shen *et al*., 2017).

The development plans in Libya have been devoting a high percentage of their investments to the formulation and implementation of new neighbourhoods in many governorates in Libya. Unfortunately, these new neighbourhoods have not fulfilled their designated goals, and most of these neighbourhoods did not have a significant role in development as they did not attract the required number of residents (Aljad, 2018). Urban neighbourhoods are typically crowded with buildings, many of which are residential buildings. Apart from the constructed quality in these neighbourhoods and the surrounding environmental quality, the quality of facility management services such as repair and maintenance, cleaning, aesthetic value, safety, privacy, and amenities are among the problems and risks affecting their social health, the environment and sustainable development in general (Gov, 2012).

Another study conducted by Mohamed, (2013) also investigated the relationship between housing conditions and the quality of life in neighbourhoods in the Tripoli, Libya. There is found that housing for the urban poor lacks physical qualities such as design, size, and materials used. Other qualities such as location, landscape, water supply, as well as the availability of public amenities and services were also lacking. The performance of these facilities is essential for sustainable development.

It is obvious that the problem of neighbourhoods housing in Libya is not a problem of quantity but a problem of quality. Most new developments do not fulfil residents' aspirations. People do not just look for a shelter where they could live but they also want an environment that improves their quality of life. On the other hand, the notion of sustainable urban neighbourhoods has recently appeared and received considerable interest in the world, as well as in Tripoli Libya. The country has established newly sustainable neighbourhoods in many governorates. However, urban planning could have a negative effect on sustainability. Therefore, the

problems within this research can be identified as follows:

➢ Lack of awareness on the significance of urban planning strategies that promote quality of sustainability in Libya, which causes the rising vacancy rate in new neighbourhoods.

➢ The absence of defined urban planning principles that contribute to improved sustainability within the neighbourhoods.

➢ Absence of assessment tools that can measure sustainability within the neighbourhoods, which can be useful for planners and designers addressing new and existing development areas.

From the findings of previous studies, it is expected that if there is enough information on sustainable urban planning development indicators, safer properties would be highly beneficial for the country's environment, economy, institutions and the society. It is worth investigating on whether neighbourhoods are sufficiently sustainable for their occupants and the general public. Therefore, a modelling framework must be developed to determine sustainable urban planning development indicators for new and existing neighbourhoods with focus on the prevention of sustainable development problems (UPA, 2009).

1.3. Research Questions and Hypothesis

With regards to all the above-mentioned issues, the researcher developed some research questions. The proposed hypotheses helped in evaluating the conceptual propositions using the collected empirical data. The researcher used rigorous and systematic techniques, which were tailored for this specific study, and analysed all the data for answering the research questions.

Research question 1: Which elements and indicators contributed to the SUPDI model of the neighbourhoods in Tripoli, Libya?

Here, the study aimed to investigate the various elements and indicators, which could contribute to the SUPDI of the neighbourhoods. For answering this research question, the researcher conceptualised the constructs of the SUPDI, based

on the literature review and the quantitative data (practitioners). This technique helped in improving the perspectives of the academicians and the engineering professionals and helped in developing knowledge regarding the SUPDI. Also developed the SUPDI modelling framework for understanding all the elements and indicators, which would be used in this thesis. Furthermore, this research question would also address the comprehensive nature of the SUPDI model as it helped in identifying the significant elements and indicators, which would be included in the model. Hence, Hypothesis one was developed for supporting this task, which is as follows:

Hypothesis 1: The various elements and indicators that were identified by reviewing the literature could contribute to the sustainable urban planning development indicators of the neighbourhoods in Tripoli, Libya?

The rest of the research questions were designed for validating the model by studying the relationship between the various SUPDI constructs. The two research questions were as follows:

Research question 2: Are all various SUPDI constructs (elements) and item (indicators) be used for determining the significance in the SUPDI model?

Research question 3: Is the SUPDI model considered valid for measuring the SUPDI of neighbourhoods in Tripoli, Libya?

This research question helps in determining the validity of the SUPDI model. The SUPDI model could be tested using the guidelines for a reflective construct validation in Smart-PLS. In detail, sets of hypotheses were developed after reviewing the literature and using the existing theory, which was conceptualised in the primary model that proposed the causal relationship of the constructs. Furthermore, the researcher empirically tested the structural model, which described the hypothesised relationship between the SUPDI constructs, based on the quantitative data.

Hypothesis 2:

H1: The indicators quality of land, quality of water, quality of materials, quality of air, quality of local environment, sea and coast, preserve of biodiversity, climate change, waste management and recycling, open space provision, natural hazard, and resource use and availability have a positive influence on SUPDI related to environmental element.

H2: The indicators education level, social equity and inclusion, social connectedness, community identity, health, security and safety, behavioural performance, housing and building quality, urban layout, preserving culture heritage, and density of population have a positive influence on SUPDI related to social element.

H3: The indicators transportation, economic development, economic standard of living, energy use, waste management cost, employment, productivity, material consumption, and investment have a positive influence on SUPDI related to economic element.

H4: The indicators institutional framework, institutional capacity, technical operation and management, urban policies and strategic, residential institutional, maintenance and service, employees have a positive influence on SUPDI related to institutional element.

H5: The sustainable urban planning development indicators model is positively related to perceived personal responsibility.

1.4. Research Objectives

The aim of this research is to develop a Sustainable Urban Planning Development Indicators (SUPDI) model for neighbourhoods in Tripoli, Libya. In addition to these aims, the objectives of this study are:

i. To assess the significant elements and indicators that explains the determinants of the SUPDI model for neighbourhoods in Tripoli, Libya.
ii. To develop SUPDI model for neighbourhoods in Tripoli, Libya.
iii. To validate the model that explains determinants of SUPDI for neighbourhoods in Tripoli, Libya.

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